Tripura Engineering Service

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TR/TES/C-I/DEG/16

Test Booklet Series

A

19.01.2017

TEST BOOKLET

CIVIL ENGINEERING PAPER – I

(DEGREE)

TPSC
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(Signature of the Candidate)

(Invigilator's Signature)

Time Allowed–3 hours (Three hours) **Maximum Marks–200**

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY TEST BOOKLET OF SAME SERIES.
2. **ENCODE CLEARLY THE TEST BOOKLET SERIES IN THE APPROPRIATE PLACE IN THE ANSWER SHEET BY BLACK BALL POINT PEN ONLY.**
3. This Test Booklet is divided into three sections, i.e **Section - A, Section - B & Section - C.**
   (A) **Section -A (MCQ pattern)** contains 40 items (questions). Each question, carrrying 2 (two) marks only, has four responses (answers). You will select the response which you want to mark on the **OMR Sheet**. In case you feel that there is more than one correct response, mark the response which you consider the most appropriate. In any case, choose ONLY ONE response for each item. There shall be no negative marking for wrong / multiple answer.
   (B) Questions under **Section - B (Conventional Method) & Section - C (Conventional Method)** are to be answered in separate answer book.
4. You have to mark all your responses of **Section - A by Black Ball Point Pen only** on the separate OMR Answer Sheet provided. See directions in the Answer Sheet.
5. Before you proceed to answer the responses to various items in the Test Booklet, you have fill in some particulars both in the Answer Sheet for Section-A and in the Answer Book for Section – B and Section – C
6. On completion of the Examination, you should hand over the OMR Answer Sheet for Section – A & Answer Book for Section – B & C to the invigilator only. You are permitted to take the Test Booklet with you.
7. Sheets for rough work are appended on the Test Booklet at the end.

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SECTION - A

Candidates are required to give their answers in their own words as far as practicable.

All symbols have their usual meaning.

Choose the correct answer from the four alternatives provided with each question and mark in the OMR answer sheet : $2 \times 40 = 80$

Example : The unit of measuring concrete work is

(A) Sq m ● cu m

(C) 10 Sq m (D) 10 cu m

1. Of the following, one which is not a type of Portland cement is

   (A) Water proof Portland cement

   (B) Water repellent Portland cement

   (C) Water absorbing Portland cement

   (D) Rapid hardening Portland cement

2. The average Compressive Strength of cubes, using rapid hardening cement, tested after 3 days immersion should not be less than

   (A) 250 kg/cm^2

   (B) 275 kg/cm^2

   (C) 300 kg/cm^2

   (D) 310 kg/cm^2

3. When the construction site is such that provision of Cofferdams, Caissons or other such dewatering measure is difficult, method which may be selected for concreting under water is

   (A) By skip or bottom plugging bucket

   (B) Lift bottom bucket

   (C) Batching

   (D) By tremie pipe

4. Type of refractory bricks, used as fire clay bricks, is

   (A) Basic refractory

   (B) Acid refractory

   (C) Neutral

   (D) None of these

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5. Structure of an Exogeneous tree does not consist of

   (A) Annular rings

   (B) Medullary rays

   (C) Medullary sheath

   (D) Medullary rings

6. One of the common defects in timber is

   (A) Heart shake

   (B) Twisted bark

   (C) Wind shake

   (D) Radial rupture

7. A body submerged in a fluid is subjected to a compressive stress equal to the hydrostatic pressure (P) on all its surface. Due to this, the body undergoes a volumetric strain when
P = Constant × Volumetric strain. This constant is known as

(A) Modulus of Elasticity

(B) Bulk Modulus

(C) Modulus of Rigidity

(D) Shear Modulus

8. A beam of length 'L' fixed at both ends, is loaded with a uniform load w per unit length. The maximum positive Bending Moment in the beam is

(A) $(wL^2)/8$

(B) $(wL^2)/10$

(C) $(wL^2)/12$

(D) $(wL^2)/24$

9. The finished bolts are not termed as

(A) Ordinary bolts

(B) Smooth bolts

(C) Rough bolts

(D) Common bolts

10. Pins for structural connections are not subjected to

(A) Shear stress

(B) Tensile stress

(C) Bearing stress

(D) Bending stress

11. One of the assumptions for design of a riveted joint is

(A) Shear stress in a rivet is neglected

(B) Shear stress in a rivet is assumed to be uniform between the contact surfaces of plate and rivet

(C) Bending stress in a rivet is neglected

(D) Bending stress in a rivet is assumed to be uniformly distributed over its gross area

12. Intermittent but welds are used to resist

(A) Shear only

(B) Bending moment only

(C) Bending moment and shear

(D) Tensile forces

13. Main internal imperfections in the weld are Gas pore, Inclusion, Incomplete penetration and

(A) Overlap

(B) Porosity

(C) Undercut

(D) Incompletely filled groove

14. One type of welded beam connections is

(A) Moment-resistant seat welded connections

(B) Direct welded framed connections

(C) Direct welded connections

(D) Direct welded seat connections

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15. Slenderness Ratio of a compression member is defined as the ratio of

(A) Appropriate radius of gyration and effective length of the compression member

(B) Effective length of the compression member and appropriate radius of gyration

(C) Actual length of the compression member and appropriate radius of gyration

(D) Appropriate radius of gyration and actual length of the compression member

16. The maximum bending stress in a beam section (if tensile) should be less than the allowable

(A) Shear stress

(B) Bending stress

(C) Bending tensile stress

(D) Bending compressive stress

17. As per relevant provision of IS 800 - 1984, effective length of compression flange of a cantilever beam is 0.75L, 'L' being the projecting length when the beam is built in at the support and

(A) restrained against torsion at the end by continuous construction

(B) free at the end

(C) against lateral bending and torsion at the free end

(D) unrestrained against torsion at the end by continuous construction

18. Of the following, all are Plate Girder elements except

(A) Web plate

(B) Web angle

(C) Flange angle

(D) Flange plate

19. For a Plate Girder, diagonal buckling of web occurs when ratio of clear depth to thickness of web exceeds

(A) 70

(B) 75

(C) 80

(D) 85

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20. Height of a slump cone is

(A) 200 mm

(B) 250 mm

(C) 300 mm

(D) 310 mm

21. An over-reinforced section is undesirable for the following causes except

(A) Failure is caused due to crushing of concrete

(B) Crushing of concrete is sudden

(C) Collapse takes place without warning

(D) Steel tends to elongate before failure

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22. As per IS : 456 - 1978, Bending Moment Coefficient, near middle of end span, for Dead load and Imposed load (fixed) for beams and slabs over continuous support is

(A) + 1/9

(B) +1/10

(C) +1/12

(D) +1/24

23. For a simply supported slab, minimum value of span/depth ratio is

(A) 28

(B) 30

(C) 32

(D) 25

24. For a square column, b×b in size, effective depth of the footing being 'd', the punching shear is calculated for an area

(A) 2b×d

(B) 2b×2d

(C) 4b×d

(D) b×4d

25. One of the following is not a type of stairs. Mark the same.

(A) Full turn

(B) Open newel

(C) Dog legged

(D) Three quarter landing

26. As stipulated in IS : 456 - 2000, some assumptions are considered in the computation of ultimate flexural strength reinforced concrete section. Of the four options given below, the odd one is to be marked.

(A) Plain sections normal to the axis remain plain after bending.

(B) The relationship between compressive stress distribution in concrete may be assumed to be rectangle, trapezoid, parabola or any other shape which results in prediction of strength in substantial agreement with test results.

(C) The meager tensile strength of concrete is not ignored

(D) The maximum strain in concrete at the extreme compression fibre is assumed as 0.003 in flexure.

27. A two way slab, supported on all sides with corners not held, is designed by

(A) Rankine - Grashoff theory method

(B) Rankine theory method

(C) Grashoff theory method

(D) Gifford - Udall theory method

28. In a prestressed concrete member, the entire cross-section becomes effective for resisting

(A) Tensile stress

(B) Compressive stress

(C) Bending

(D) Shear stress

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29. A beam supports a slab on any other structural member on one side only. In the supported beam, tendency of the angular rotation of the supported member causes

(A) Angular moment

(B) Twisting moment

(C) Over turning moment

(D) Torsion

30. When a number of columns in a row are provided with a long and narrow combined footing, the footing is termed as

(A) Strap footing

(B) Strip footing

(C) Cantilever footing

(D) Trapezoidal footing

31. Various operations in the manufacture of bricks are given below of which one is not correct. The incorrect one is

(A) Preparation of soil

(B) Moulding

(C) Drying

(D) Stacking

32. Clam shell is a machine used for

(A) Excavating

(B) Excavating and carrying

(C) Hoisting

(D) Hauling

33. Wheel Barrow is an equipment used in a concrete project for

(A) Batching aggregates

(B) Mixing concrete

(C) Mixing water

(D) Handling cement

34. In a network or Flow diagram, starting of the subsequent activities is represented by

(A) Arrow

(B) Circle

(C) Firm line

(D) Capital letter

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35. It is a check for fixing intermediate dates within the network for start and finish of parallel activities, when activities are not coincident. It has a duration. It is termed as

(A) Restraint

(B) Check

(C) Control

(D) Regulating

36. In a network, the arrow end denotes completion of job or end of activity and the tail represents the

(A) Start

(B) Hindrance in the project

(C) Delay in start

(D) Preparation time

37. The time difference between Total Float and Free Float is known as

(A) Actual Float

(B) Apparent Float

(C) Interfering Float

(D) Effective Float

38. Since in CPM (Critical Path Method), the analysis is essentially in the form of networks, this method is also known as

(A) Network Analysis

(B) Critical Path Analysis

(C) Resources Distribution for Multi-Project Scheduling

(D) Networking

39. One salient feature of the CPM is

(A) Idle periods are eliminated

(B) Relation between various activities can not be established

(C) The relativity of activities can not be shown

(D) Bottlenecks in the execution of the project is simplified during progress of the project

40. Of the four options given below, three are related to prestressed concrete. The fourth one is

(A) It requires skilled operation

(B) It requires comparatively expensive equipments

(C) It is economical for small projects

(D) It is economical for prefabricated components.

SECTION-B

Answer the following questions. (Each answer should be restricted to 40 words) : 6×15=90

1. Name the various tests specified by ISI for testing of cement.

   Vicat's needle penetrates cement paste 5 to 7 mm from the bottom of the mould. What can we conclude from this ?

2. What is seasoning of timber ? Name the various types of artificial seasoning of timber.

3. State, in brief, the properties that hardened concrete should possess after a curing period of 28 days.

4. What is curing of concrete ? What happens in the concrete during the process of curing ?

5. Define Modulus of Elasticity and Bulk Modulus.

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6. What is a doubly reinforced section ? When it is resorted to ?

7. Mention the IS Codes which have specified the minimum design requirements of earthquake resistant design based on probability of occurrence of earthquakes, the characteristics of the structures and the foundation and the acceptable magnitude of damage. Define Ductility of Reinforced Concrete Members.

8. Discuss in brief, the isolation concept in Earthquake resistant design.

9. Concrete pump is a very important equipment in concrete construction in certain typical conditions. What are these conditions ? Discuss about the different types of concrete pumps.

10. Some commonly used terms in Project Management with CPM (Critical Path Method) are Activity, Dummy Activity and Early Start Time. Explain these terms.

11. What are the various losses due to prestressing ?

12. Welding has several advantages over riveting, but it has some disadvantages also. State, in brief, the disadvantages of welding.

13. What are the various elements of a Plate Girder ? When a web plate is kept unstiffened ? Why stiffeners are provided ?

14. A structure may become unfit for its intended purpose in terms of either safety or serviceability. In this context, explain the prominent Limit States.

15. Column bases are of two types : Slab bases and Gusseted bases. Discuss, in brief, about these two column bases.

SECTION-C

5×6=30

Answer the following questions :

1. The interior panels of a flat slab, 6m×6m, of a warehouse is to be designed using M-20 grade concrete and Fe-415 grade HYSD bars. Permissible stresses are to be suitably assumed. Find out the maximum bending moment and overall depth of the slab near drops.

2. A cantilever beam of clear span 2.5m, monolithic with R C column 300 mm wide and 450 mm deep, is subjected to a working live load 20 kN/m. Design the main reinforcements of the cantilever beam. Adopt : f_{ck} = 20N/mm^2 and fy = 415N/mm^2

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